Course Specifications

University: Benha University  
Faculty: High Institute of Technology

Course specifications
Programme(s) on which the course is given: Mechanical Engineering
Major or minor element of programmes
Department offering the programme: Mechanical Engineering
Department offering the course: Mechanical Production Engineering
Academic year / Level: 4  
Power and Production
Date of specification approval

A- Basic Information

Title: Material Technology  
Code: M 462
Credit Hours: 4  
Lecture: 3
Tutorial: 1  
Practical: 2  
Total: 6

B- Professional Information

1 - Overall aims of course
By the end of the course the students will be able to:

- get an understand of structures and properties of ceramics and composite materials
- understand the interrelationship between materials parameters, design and manufacturing processes and their impact on cost,
- use materials data base as well as standard specifications for materials and products, to select the engineering material after certain criteria and specific applications regarding quality and cost,
- find out alternatives due to available materials or manufacturing facilities,
- know about new materials and new technology.

Student shall attain the above mentioned objectives through lectures, tutorial for problem solving and laboratory for experiments and microscopic examinations.

2- Intended learning outcomes of course (ILOs)
a. Knowledge and understanding:
a.1 Understand Essential facts, fundamentals, concepts, principles and theories relevant to ceramics and composites,

a.2 Know characteristics and properties of materials and criterion of material selection for a specific application,

a.3 Define low temperature applications and new materials relevant to mechanical engineering applications.

b. Intellectual skills
b.1 Use the principles of materials science in developing solutions to practical engineering problems.

b.2 Maintain a sound theoretical approach in dealing with new and advancing material technology.

c- Professional and practical skills
c.1 Employ computational facilities, measuring instruments, workshops and laboratories equipment to design experiments and collect, analyze and interpret results of materials structures and properties.

c.2 Merge knowledge and understanding of material properties and technology to improve design, products and services.

3- Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>No. of Hours</th>
<th>Lecture</th>
<th>Tutorial/Practical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceramics</td>
<td>12</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>composite materials</td>
<td>18</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Quantitative material selection</td>
<td>12</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Materials for low temperature applications</td>
<td>18</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Selection of materials to satisfy mechanical requirements including the concept of cost per unit property</td>
<td>12</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>New trends in materials technology</td>
<td>18</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

4- Teaching and learning methods

4.1 - Lectures
4.2 - Problem solving sessions
4.3 - Laboratories

5- Student assessment methods

5.1 Written exam to assess ILO a1, a2, b1
5.2 problem solving to assess ILO a2, b1, c1, c2
5.3 labs to assess ILO a1, a2, b1
5.4 Oral exam to assess ILO a1, a2, b2, c2

Assessment schedule

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Type</th>
<th>Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment 1</td>
<td>Written exam</td>
<td>5</td>
</tr>
<tr>
<td>Assessment 2</td>
<td>Written exam</td>
<td>10</td>
</tr>
<tr>
<td>Assessment 3</td>
<td>Oral exam</td>
<td>15</td>
</tr>
</tbody>
</table>

Weighting of assessments

- Final-term examination: 60%
- Semester work: 20%
- Practical work: 10%
- Oral exam: 10%
- Total: 100%

6- List of references

6.1- Course notes
   - Course notes of Material Technology

6.2- Essential books (text books)
   - M. F. Ashby, Materials Selection in mechanical design, Elsevier 1999,

6.3- Recommended books

6.4- Periodicals, Web sites
7- Facilities required for teaching and learning
   Lecture rooms
   Classrooms for problem solving sessions
   Materials laboratory

Course coordinator: Prof. Adel Omar
Head of Department: Prof. Sameh Nada
Date: / /